Title
Teaching Reading in Science

Target Audience
This course is intended for pre-service and in-service science teachers, grades 3-12.

Prerequisites
To successfully participate in this course, you should be familiar with taking an online course or have gone through the TeacherLine Practice Learning Online Course. You should also be familiar with elementary, middle or high school science content.
Note: Learners must have access to a science textbook and have had experience teaching or observing a science classroom.

Course Description
This course will examine ways of teaching reading in science, as well as elements of reading and the premises that guide reading in science. This course centers on strategies for teaching the reading of science text in new ways so students can engage with texts to further their reading comprehension and understanding of science content. With the right tools to improve their reading skills, students will be better prepared to construct meaning from their science textbooks. Online facilitators equip learners with strategies to help struggling students with organizing ideas, understanding text organization, setting purpose for reading, making meaningful connections, and persevering through reading materials. Learners will collaborate with others in an online forum, comparing ideas and drawing from personal professional experiences. As part of the assignments, learners will test course materials and ideas in a classroom setting, working with students, and assessing the effectiveness of the teaching strategies.

Instructor/Facilitator
See instructor/facilitator sheet

Credits
To be determined by college or university.

Goals
The goal is for teachers to apply numerous reading strategies as they plan lessons in order to provide more support for students as they interact with science texts. Throughout this course the learner will encounter methods to engage students with science texts, through the means of reading, interacting, journaling, discussing, and applying a range of strategies. The result will be teachers who are better equipped to assist students in learning science concepts thereby improving student achievement.

At the end of this course, learners will:
• Understand the critical need for helping students learn to read in science.
• Read about reading theory and research.
• Explore and implement specific strategies to support students.
Learner Outcomes

Students completing Teaching Reading in Science will:

• Describe a rationale for using reading strategies to enhance science instruction.
• Compare three interactive elements of reading and explain how these three elements must overlap in order for reading to be effective.
• Review and apply reading strategies for: a) motivating the reader, b) teaching vocabulary content, and c) reflecting upon and constructing knowledge.
• Design a student learning experience that utilizes the reading strategies to improve student understanding of science concepts.

Outline of Content and Assignments

After previewing the course introductory information, learners will proceed to the Assignments section to complete the following six sessions, working through each session in order. Essential information pertaining to the topic is presented at various points within the course. Throughout the sessions, learners are asked to articulate their ideas in various forms. They are encouraged to reflect on their ideas and experiences in their online journals. The weekly discussions are designed to allow learners to glean information from other learners’ experiences with strategies both prior to and following the completion of the weekly assignments. Learners are given a final project to apply reading in science strategies to a student learning experience.

This course is designed to address the National Research Council’s (NRC’s) NSES (1996). The NSES reflect some of the most current research on science teaching and learning, and present a vision of instruction that should enable all students to successfully interact with the natural world.

In Session 1 of this course, learners will read a portion of the NSES related to principles and definitions used in the NRC’s vision of science education. These principles include, (1) Science is for all students, (2) Learning science is an active process, (3) School science reflects the intellectual and cultural traditions that characterize the practice of contemporary science, and (4) Improving science education is part of systemic education reform. The NSES describes these principles and the associated tensions that may result as they are implemented into science programs.

Session 1: Why Teach Reading in Science?

Learners will:

• Define their professional goals and expectations for this course in the online journal.
• Explain previous knowledge about teaching reading in science.
• Compare and contrast individual beliefs with the principles of the National Science Education Standards using an anticipation guide.
• Explain some of the theories about how people learn using the K-W-L strategy.
• Discuss similarities and differences of how students approach reading in science.
• Reflect on their greatest insight from the session, what questions they have about reading in science and what they would like to learn in this course.

Read

• “Chapter Two: National Science Education Standards”
• “Rationale for Learning to Read in Science”
• “Six Assumptions About Learning”
Write in online journal
- Reflect on professional goals and expectations.
- Reflect on prior knowledge.
- Reflect on insights gained thus far in the course and questions they still have.

Participate in an online discussion
- Introduce themselves to other learners.
- Discuss the survey results.

Complete activities and assignments
- Complete an Anticipation Guide for “Chapter Two: National Science Education Standards.”
- Complete a Rationale Anticipation Guide.
- Review the “Expedition Panama – Echoes in the Night” lesson plan from Scientific American Frontiers.
- Complete a K-W-L Chart for “Six Assumptions About Learning.”
- Explore lesson plans from PBS that incorporate K-W-L charts.
- Survey students on how they approach reading in science.

Session 2: The Interactive Elements of Reading

Learners will:
- Discuss how they could incorporate reader strategies into a teaching experience.
- Reflect on their concerns about how students may be affected by the classroom climate and their ideas for how changes in teaching may improve the climate for learning.
- Reflect on their concerns with text style or structure in reading materials.
- Reflect on which student behaviors or comments may indicate difficulty with text style or structure.

Write in online journal
- Reflect on concerns about classroom climate that may be adversely affecting students.
- Reflect on concerns with text style or structure in reading materials.

Participate in an online discussion
- Discuss prior lessons and identify strategies that seem promising to help readers succeed.

Session 3: Removing Barriers in Text Materials

Learners will:
- Discuss how they would balance direct instruction and modeling with opportunities for student application and independent practice.
- Discuss how they would motivate students to apply reading strategies independently.
- Describe how and when they would use a given prereading strategy with students.
- Reflect on how the prereading strategy will address the reader, climate, and text structure.
- Describe how and when they would use a given reading strategy with students.
- Reflect on how the reading strategy will address the reader, climate, and text structure.
- Write a plan for how they will implement two prereading or reading strategies in their classroom instruction in the Reading to Learn Strategies Chart.

Complete activities and assignments
- Explore prereading strategies
- Watch the Graphic Organizer video
• Explore science lesson plans from PBS
• Explore reading strategies
• Complete the Reading to Learn Strategies Chart for prereading and/or reading strategies

Write in online journal
• Chose a prereading strategy you would like to use with your students. Describe when and how you would use your chosen strategy. How will the strategy address the reader, climate, and text structure?
• Chose a reading strategy you would like to use with your students. Describe when and how you would use your chosen strategy. How will the strategy address the reader, climate, and text structure?

Participate in an online discussion
• How would you balance direct instruction and modeling with opportunities for student application and independent practice?
• How would you motivate students to apply strategies independently?

Session 4: Vocabulary in Science

Learners will:
• Reflect on the effectiveness of their current science vocabulary instruction and the differences between how they learn new vocabulary terms and how they teach new vocabulary terms.
• Discuss what changes they would like to make to their vocabulary instruction.
• Write a plan for how they will implement two vocabulary strategies in their classroom instruction in the Reading to Learn Strategies Chart.

Read
• “Teaching Vocabulary”
• “The Clarifying Routine: Elaborating Vocabulary Instruction”

Write in online journal
• Respond to the following: How do you currently address new science vocabulary terms that your students encounter? How effective has this been for your students? How do you normally deal with new vocabulary words in your personal or professional reading? What are the differences between how you learn new vocabulary terms and how you teach new vocabulary terms?

Participate in an online discussion
• What changes would you like to make to your vocabulary instruction based on the readings in this session?

Complete activities and assignments
• Science Vocabulary Quiz
• Explore vocabulary strategies
• Explore the Concept Definition Map interactive
• Explore the Stars interactive
• Watch the Closed Word Sort video
• Watch the Open Word Sort video
• Watch the Insert Notetaking video
• Complete the Reading to Learn Strategies Chart for vocabulary strategies

Session 5: Reflection, Constructing Meaning, and Applying Information from Text
Learners will:

- Discuss what types of prompts are useful to get students to write in their science journal.
- Write a plan for how they will implement two reflection or comprehension strategies in their classroom instruction in the Reading to Learn Strategies Chart.

Read

- Text Comprehension
- “Understanding and Recognizing: Writing Disabilities”
- Responses: Writing

Participate in an online discussion

- Discuss what types of prompts are useful to get students to write in their science journal.

Complete activities and assignments

- Explore reflection strategies
- Explore the Nature Journaling lesson plan from PBS
- Explore the Composition Activity interactive
- View the “Making Writing Automatic” video
- Create a Learning Log Activity
- Explore comprehension strategies
- View the Discussion Web video
- Explore science debate lesson plans from PBS
- Complete the Constructing Meaning and Initiating Debate Strategy assignment

Session 6: Putting it all Together

Learners will:

- Describe two or three concepts or ideas from this course that will positively affect students’ learning.
- Reflect on the implementation of the Reading-to-Learn strategy in the classroom.
- Assess learning in this course by comparing prior knowledge and acquired knowledge in the online journal.
- Analyze the learning experience in this course by reflecting on professional goals and expectations in the online journal.

Write in online journal

- Reflect on acquired knowledge
- Reflect on goals and expectations of course.

Final Project

- Complete Part 2 of the Final Project: Implement the reading to learn activity plan with a group of students.
- Complete the reflection paper assignment

Complete activities and assignments

- Complete the post-course evaluation survey

Schedule

This course is scheduled to take approximately 30 hours to complete readings, activities, video, assignments, reflections, and a final project. The number of hours identified for each course reflects time spent online, but does not reflect the total time spent completing offline coursework and assignments. All
learners are different and learners will likely spend double the indicated number of hours completing all coursework depending on learning styles and work habits.

**Requirements**

Learners are expected to:
- Complete all assignments.
- Maintain an online journal.
- Participate and actively engage in discussions with fellow learners while contributing to the social construction of knowledge.
- Be self-directed and self-motivated.
- Ask for assistance when they need it.

**Materials** (hardware, software, plug-ins)

**Technical Requirements**
- Word processor
- Internet service provider
- E-mail

**Academic Dishonesty Policy**

To be inserted by university institution only

**Evaluation**

This course is evaluated on a letter grade basis, and may be available for graduate credit. See graduate credit details pertaining to specific graduate credit institutions.